

CLAIMS

What is claimed is:

1. A method of preventing unnecessary data packets from being sent between
a point-to-point network and a shared medium network, said point-to-point network
5 and said shared medium network having a plurality of nodes therein including at least
one network access point, comprising:

receiving data packets from said point-to-point network and said shared
medium network at said network access point;

filtering each data packet based on a destination address thereof at said
10 network access point if said data packet was received from said shared medium
network; and

filtering each data packet based on said broadcast type thereof at said network
access point if said data packet was received from said point-to-point network, and
further filtering said data packet based on a destination address thereof if said data
15 packet received from said point-to-point network passed said broadcast type filtering.

2. The method according to claim 1, wherein said broadcast type includes: a
first broadcast type covering a single service area, a second broadcast type covering a
single point-to-point network, a third broadcast type covering a single administrative
20 domain, and a fourth broadcast type covering a single point-to-point network and a
single administrative domain.

3. The method according to claim 2, wherein said broadcast type filtering is
performed only on a point-to-point network side of said network access point.

4. The method according to claim 3, wherein said broadcast type filtering includes passing all data packets having said first broadcast type and said second broadcast type to an internal handling function of said network access point.

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5. The method according to claim 4, wherein said destination address based filtering comprises learning a source address of a data packet to determine whether a source node of said data packet can be reached via a point-to-point network interface of said network access point or via a shared medium network interface of said network access point.

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6. The method according to claim 5, wherein learning a source address of a data packet includes learning a source address of every data packet received from said shared medium network at said network access point.

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7. The method according to claim 6, wherein learning a source address of a data packet further includes learning a source address of every data packet received from said point-to-point network at said network access point except for data packets having said second broadcast type.

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8. The method according to claim 7, wherein said destination address based filtering further includes storing said source addresses learned from said data packets for a predetermined interval in said network access point along with an indication for each source address whether a source node thereof can be reached via a point-to-point

network interface of said network access point or via a shared medium network interface of said network access point.

9. The method according to claim 8, wherein said source addresses and said
5 indications are stored in said network access point in an address table.

10. The method according to claim 9, wherein only source nodes located in a service area of said network access point have an indication of being reachable via said point-to-point network interface of said network access point.

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11. The method according to claim 10, wherein source nodes not located in said service area of said network access point have an indication of being reachable via said shared medium network interface of said network access point.

15 12. The method according to claim 11, wherein storing said source addresses includes storing additional information for source nodes that have been indicated as being reachable via said shared medium network interface of said network access point.

20 13. The method according to claim 12, wherein said additional information indicates, for each source node, whether said source node is located in said shared medium network or in said point-to-point network outside said service area of said network access point.

14. The method according to claim 13, wherein if said additional information indicates that said source node is located in said point-to-point network outside said service area of said network access point, said additional information further includes an indication of another network access point via which said source node can be
5 reached.

15. The method according to claim 14, wherein said indication of another network access point is a MAC address of said network access point.

10 16. The method according to claim 13, wherein said additional information is extracted from encapsulated route requests and encapsulated route replies carried by said data packets.

17. The method according to claim 13, wherein said additional information is
15 extracted from an information message sent from another network access point to indicate that said source node is located in a service area of said other network access point.

18. The method according to claim 9, wherein said destination address based
20 filtering further includes passing general broadcast type data packets to a bridging function of said network access point.

19. The method according to claim 9, wherein said destination address based filtering further includes passing a unicast data packet to a bridging function of said

network access point unless said address table indicates a destination node of said unicast data packet is reachable via an interface of said network access point via which said unicast data packet was received.

5 20. The method according to claim 19, wherein said destination address based filtering further includes passing said unicast data packet to an internal packet handling function of said network access point if said network access point is said destination node of said unicast data packet.

10 21. The method according to claim 9, wherein said destination address based filtering further includes passing ARP route request, encapsulated ARP route request, and ARP request data packets to an internal packet handling function of said network access point if said network access point is a target node of said ARP route request, encapsulated ARP route request, or ARP request data packet.

15 22. The method according to claim 21, wherein if said network access point is not a destination node of said ARP route request, encapsulated ARP route request, or ARP request data packet, said destination address based filtering further includes retrieving a target IP address from said ARP route request, encapsulated ARP route
20 request, or ARP request data packet, searching an ARP cache of said network access point for a MAC address corresponding to said target IP address, and determining whether to pass said ARP route request, encapsulated ARP route request, or ARP request data packet to a bridging function of said network access point based on said MAC address.

23. The method according to claim 22, wherein if said MAC address cannot
be retrieved from said ARP cache, said destination address based filtering further
includes passing said ARP route request, encapsulated ARP route request, or ARP
5 request data packet to said bridging function of said network access point.

24. The method according to claim 9, wherein said destination address based
filtering further includes passing non-ARP route request data packets to an internal
packet handling function of said network access point if said network access point is a
10 destination node of said non-ARP route request data packets.

25. The method according to claim 24, wherein if said network access point is
not a destination node of said non-ARP route request data packets, said destination
address based filtering further includes passing said non-ARP route request data
15 packets to a bridging function of said network access point unless said address table
indicates said destination node is reachable via an interface of said network access
point via which said unicast data packets were received.

26. The method according to claim 9, wherein said destination address based
20 filtering further includes passing all broadcast ARP replies received from said point-
to-point network to a bridging function of said network access point.

27. The method according to claim 9, wherein said destination address based
filtering further includes retrieving a target MAC address from a broadcast ARP reply

received from said shared medium network and passing said ARP reply to a bridging function of said network access point if said address table contains no entry for said target MAC address.

5 28. The method according to claim 9, wherein said destination address based filtering further includes retrieving a target MAC address from a broadcast ARP reply received from said shared medium network and passing said ARP reply to a bridging function of said network access point if said address table indicates said target MAC address is reachable via said point-to-point network interface of said network access
10 point.

 29. The method according to claim 28, wherein if said address table indicates said MAC address is reachable via said shared medium network interface of said network access point, said destination address based filtering further includes
15 retrieving a sender IP address and a sender MAC address from said ARP reply, searching an ARP cache of said network access point for a cached IP address corresponding to said sender IP address, and passing said ARP reply to a bridging function of said network access point only if a cached MAC address associated with said cached IP address is different from said sender MAC address.

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 30. The method according to claim 29, wherein said destination address based filtering further is performed before said ARP cache is updated with said sender IP address and said sender MAC address.

31. The method according to claim 9, wherein said destination address based filtering further includes receiving a broadcast ARP reply without a target MAC address and passing said broadcast ARP reply to a bridging function of said network access point regardless of whether said broadcast was received from said point-to-
5 point network or said shared medium network.

32. A system for preventing unnecessary data packets from being sent between a point-to-point network and a shared medium network, bridging a point-to-point network with a shared medium network, comprising:
10 at least one network access point connecting said point-to-point network to said shared medium network;
a filtering function in said at least one network access point, said filtering function configured to filter data packets sent between said shared medium network to said point-to-point network; and
15 said filtering function including a destination address based filter configured to filter data packets received from said shared medium network, and a broadcast type based filter configured to filter data packets received from said point-to-point network, said broadcast type filter further configured to filter said data packets received from said point-to-point network based on a destination address thereof if
20 said data packets passed said broadcast type filtering.

33. The system according to claim 32, wherein said broadcast type based filter is configured to filter data packets based on a broadcast type thereof.

34. The system according to claim 33, wherein said broadcast type includes: a first broadcast type covering a single service area, a second broadcast type covering a single point-to-point network, a third broadcast type covering a single administrative domain, and a fourth broadcast type covering a single point-to-point network and a single administrative domain.

35. The system according to claim 34, wherein said broadcast type based filter is configured to cause said network access point to pass all data packets having said first broadcast type and said second broadcast type to an internal handling function of said network access point.

36. The system according to claim 35, wherein said destination address based filter is configured to cause said network access point to learn a source address of a data packet to determine whether a source node of said data packet can be reached via a point-to-point network interface of said network access point or a shared medium network interface of said network access point.

37. The system according to claim 36, wherein said destination address based filter is further configured to cause said network access point to learn a source address of every data packet received from said shared medium network at said network access point.

38. The system according to claim 37, wherein said destination address based filter is further configured to cause said network access point to learn a source address

of every data packet received from said point-to-point network at said network access point except for data packets having said second broadcast type.

39. The system according to claim 38, wherein said destination address based
5 filter is further configured to cause said network access point to store said source addresses learned from said data packets for a predetermined interval in said network access point along with an indication for each source address whether a source node thereof can be reached via a point-to-point network interface of said network access point or a shared medium network interface of said network access point.

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40. The system according to claim 39, wherein said source addresses and said indications are stored in said network access point in an address table.

41. The system according to claim 40, wherein only source nodes located in a
15 service area of said network access point have an indication of being via said point-to-point network interface of said network access point.

42. The system according to claim 41, wherein source nodes not located in said service area of said network access point have an indication of being reachable
20 via said shared medium network interface of said network access point.

43. The system according to claim 42, wherein said network access point stores said source addresses by storing additional information for source nodes that have been indicated as being located in said shared medium network.

44. The system according to claim 43, wherein said additional information indicates, for each source node, whether said source node is located in said shared medium network or in said point-to-point network.

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45. The system according to claim 44, wherein if said additional information indicates that said source node is located in said point-to-point network outside said service area of said network access point, said additional information further includes an indication of another network access point via which said source node can be reached.

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46. The system according to claim 45, wherein said indication of another network access point is a MAC address of said network access point.

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47. The system according to claim 44, wherein said additional information is extracted by said network access point from encapsulated route requests and encapsulated route replies carried by said data packets.

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48. The system according to claim 44, wherein said additional information is extracted from an information message sent from another network access point to indicate that said source node is located in a service area of said other network access point.

49. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to pass general broadcast type data packets to said bridging function of said network access point.

5 50. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to pass a unicast data packet to a bridging function of said network access point unless said address table indicates a destination node of said unicast data packet is reachable via an interface of said network access point via which said unicast data packet was received.

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51. The system according to claim 50, wherein said destination address based filter is further configured to cause said network access point to pass said unicast data packet to an internal packet handling function of said network access point if said network access point is a destination node of said unicast data packet.

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52. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to pass ARP route request, encapsulated ARP route request, and ARP request data packets to an internal packet handling function of said network access point if said network access point is a target node of said ARP route request, encapsulated ARP route request, or ARP request data packet.

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53. The system according to claim 52, wherein if said network access point is not a destination node of said ARP route request, encapsulated ARP route request, or

ARP request data packet, said destination address based filter is further configured to cause said network access point to retrieve a target IP address from said ARP route request, encapsulated ARP route request, or ARP request data packet, search an ARP cache of said network access point for a MAC address corresponding to said target IP address, and determine whether to pass said ARP route request, encapsulated ARP route request, or ARP request data packet to a bridging function of said network access point based on said MAC address.

54. The system according to claim 53, wherein if said MAC address cannot be retrieved from said ARP cache, said destination address based filter is further configured to cause said network access point to pass said ARP route request, encapsulated ARP route request, or ARP request data packet to said bridging function of said network access point.

55. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to pass non-ARP route request data packets to an internal packet handling function of said network access point if said network access point is a destination node of said non-ARP route request data packets.

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56. The system according to claim 55, wherein if said network access point is not a destination node of said non-ARP route request data packets, said destination address based filter is further configured to cause said network access point to pass said non-ARP route request data packets to a bridging function of said network access

point unless said address table indicates said destination node is reachable via an interface of said network access point via which said unicast data packets were received.

5 57. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to pass all broadcast ARP replies received from said point-to-point network to a bridging function of said network access point.

10 58. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to retrieve a target MAC address from a broadcast ARP reply received from said shared medium network and pass said ARP reply to a bridging function of said network access point if said address table contains no entry for said target MAC address.

15 59. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to retrieve a target MAC address from a broadcast ARP reply received from said shared medium network and pass said ARP reply to a bridging function of said network access point if said address
20 table indicates said target MAC address is reachable via said point-to-point network interface of said network access point.

 60. The system according to claim 40, wherein if said address table indicates said MAC address is reachable via said shared medium network interface of said

network access point, said destination address based filter is further configured to cause said network access point to retrieve a sender IP address and a sender MAC address from said ARP reply, search an ARP cache of said network access point for a cached IP address corresponding to said sender IP address, and pass said ARP reply to
5 a bridging function of said network access point only if a cached MAC address associated with said cached IP address is different from said sender MAC address.

61. The system according to claim 60, wherein said destination address based filter is performed before said ARP cache is updated with said sender IP address and
10 said sender MAC address.

62. The system according to claim 40, wherein said destination address based filter is further configured to cause said network access point to receive a broadcast ARP reply without a target MAC address and pass said broadcast ARP reply to a
15 bridging function of said network access point regardless of whether said broadcast was received from said point-to-point network or said shared medium network.